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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,736	12/05/2003	Vittorio Castelli	YOR920030355US1 (8728-642	1339

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F. CHAU & ASSOCIATES, LLC
130 WOODBURY ROAD
WOODBURY, NY 11797

EXAMINER	
PHAM, THAI V	

ART UNIT	PAPER NUMBER
2192	

DATE MAILED: 11/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/729,736	CASTELLI ET AL.	
	Examiner	Art Unit	
	Thai Van Pham	2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/05/2003*.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1. This office action is in response to amendment filed on 10/17/2006.

2. The objection to the Specification is withdrawn in view of Applicant's amendment.

3. The objection to the Drawings is withdrawn in view of Applicant's amendment.

4. The objection to the Claims is withdrawn in view of Applicant's amendment.

5. The 35. U.S.C. 112 1st paragraph rejection of claims 2 – 10 are withdrawn in view of Applicant's amendment and further review by the examiner.

6. Per Applicant's request, claims 2 – 10 have bee amended.

7. Per Applicant's request, claim 19 has been cancelled.

8. Per Applicant's request, claim 20 has been added.

9. Claims 1 – 18 and 20 remain pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1 – 18 are rejected under 35 U.S.C. 102(b) as being anticipated by **Bellegarda** (5,644,652).

-- Claims 1 and 18:

Bellegarda discloses *a method* and *a machine-readable medium having instructions stored thereon for generating one or more computer-executable procedures, comprising the steps of*:

- *recording at least one trace of at least one instance of a procedure* (receiving character or stroke information produced by a user using the stylus – procedure is the capturing of character or stroke; Fig. 2, page 5 lines 24 – 32);
- *simultaneously performing an alignment and generalization of the at least one trace* (data is sorted by independent writer and Viterbi aligned for each writer; Figs. 6 – 7, page 9 line 59 – page 11 line 49); and
- *generating the one or more computer-executable procedures consistent with the alignment and generalization* (Fast Match and Detailed Match; Fig. 5, page 8 line 42 – page 9 line 48).

-- Claim 2:

Bellegarda discloses *the method of claim 1, wherein simultaneously performing an alignment and generalization of the at least one trace further comprises the steps of:*

• *computing all possible alignments and generalizations of the at least one trace* (Viterbi alignments for independent writers; Figs. 6, page 9 line 59 – page 10 line 27); and

• *selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes an alignment-generalization functional* (Tree construction and prunning to computer mixture coefficients for each fenone which are used in Fast and Detailed Matches; Figs. 7 – 9, page 10 line 28 – page 13 line 29).

-- Claim 3:

Bellegarda discloses *the method of claim 2, wherein selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes the alignment-generalization functional comprises selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes an alignment functional* (Fig. 6, page 9 line 59 – page 10 line 27) and a generalization functional (Figs. 8 – 9, page 11 line 50 – page 13 line 29).

-- Claim 4:

Bellegarda *discloses the method of claim 3, wherein selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes the alignment functional and the generalization functional comprises selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes the alignment functional equal to a sum of steps correctly predicted by a*

procedure model (Viterbi alignments for independent writers; Figs. 6, page 9 line 59 – page 10 line 27).

-- Claim 5:

Bellegarda discloses *the method of claim 3, wherein selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes the alignment functional and the generalization functional comprises selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes the generalization functional that is equal to a sum of steps correctly generalized by a procedure model* (Tree construction and pruning for each distinct input vectors; Figs. 8 – 9, page 11 line 50 – page 13 line 29).

-- Claim 6: **Bellegarda** *discloses the method of claim 2, wherein selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes the alignment-generalization functional comprises selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes a monotonically increasing function of an alignment functional and a generalization functional* (constructing a Tree with maximized distance between centroid pairs and pruning a Tree with a number of leaf above a desired threshold; Figs. 8 – 9, page 11 line 50 – page 13 line 29).

-- Claim 7:

Bellegarda discloses *the method of claim 6, wherein selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes a*

monotonically increasing function of the alignment functional and the generalization functional comprises selecting the alignment and the generalization from the all possible alignments and generalizations that maximizes a linearly increasing function of the alignment functional and the generalization functional (a well-known maximum likelihood algorithm; page 9 lines 32 – 35).

-- Claim 8:

Bellegarda discloses *the method of claim 1, wherein simultaneously performing an alignment and generalization of the at least one trace further comprises selecting an alignment and generalization by maximizing an alignment-generalization functional using an optimization technique* (constructing a Tree with maximized distance between centroid pairs and pruning a Tree with a number of leaf above a desired threshold; Figs. 8 – 9, page 11 line 50 – page 13 line 29).

-- Claim 9:

Bellegarda discloses *the method of claim 8, wherein selecting an alignment and generalization by maximizing an alignment-generalization functional using an optimization technique comprises selecting an alignment by maximizing the alignment-generalization functional using an iterative optimization technique* (constructing a Tree with maximized distance between centroid pairs and pruning a Tree with a number of leaf above a desired threshold; Figs. 8 – 9, page 11 line 50 – page 13 line 29).

-- Claim 10:

Bellegarda discloses *the method of claim 9, wherein selecting an alignment by maximizing the alignment-generalization functional using an iterative optimization technique comprises selecting an alignment by maximizing the alignment-generalization functional using a gradient-descent technique* (a well-known maximum likelihood algorithm; page 9 lines 32 – 35).

-- Claim 11:

Bellegarda discloses *the method of claim 1, wherein simultaneously performing an alignment and generalization of the at least one trace further comprises the steps of:*

- *computing an initial alignment and generalization of the at least one trace* (Viterbi alignments for independent writers; Figs. 6, page 9 line 59 – page 10 line 27);
- *generating a procedure model of the initial alignment* (supervision technique; Fig. 7, page 11 lines 1 – 49); and
- *computing a best alignment and generalization of the procedure model* (Fast and Detail Matches in Decoding Phase; Fig. 5, page 8 line 42 – page 9 line 48).

-- Claim 12:

Bellegarda discloses *the method of claim 11, further comprising the step of: repeating the steps of determining the initial alignment, generating the procedure model, and determining the best alignment until a local optimum is detected* (identifying the character with associated top score in Fast and Detail Matches in Decoding Phase; Fig. 5, page 8 line 42 – page 9 line 48).

-- Claim 13:

Bellegarda discloses *the method of claim 11, wherein generating a procedure model of the initial alignment comprises generating a Hidden Markov Model of the initial alignment* (writer-independent Hidden Markov Models; Figs. 6, page 9 line 59 – page 10 line 27).

-- Claim 14:

Bellegarda discloses *the method of claim 13, wherein generating a Hidden Markov Model of the initial alignment comprises generating an Input/Output Hidden Markov Model of the initial alignment* (Applicant explicitly discloses that if generalization is ignored, the Hidden Markov Model is equivalent to Input-Output Hidden Markov Model. Alternatively stated, if the state of the computer system at a specific step is interpreted as input and the user action as output, then each model node *n* has two associated functions; transition and output functions. The transition function yields a probabilistic assignment of the current step over the nodes given the input at the current step and that the previous node is *n*. The output function yields a probabilistic assignment of the current user action over all possible user actions given the input at the current user action over all possible user actions given the input at the step and that the current node is *n*. Items 701 + 619 and 703 – 709 of Fig. 7 meet the above stated requirements for IOHMM; Fig. 7, page 11 lines 1 – 49).

-- Claim 15:

Bellegarda discloses *the method of claim 1, wherein simultaneously performing an alignment and generalization of the at least one trace further comprises the steps of:*

• *determining an initial alignment and generalization of the at least one trace* (Viterbi alignments for independent writers; Figs. 6, page 9 line 59 – page 10 line 27);

• *generating a transition model and an action model of the initial alignment and generalization* (supervision technique; Fig. 7, page 11 lines 1 – 49); and

• *determining a best alignment of the transition model and the action model* (Fast and Detail Matches in Decoding Phase; Fig. 5, page 8 line 42 – page 9 line 48).

-- Claim 16:

Bellegarda discloses *the method of claim 15, wherein further comprising the step of: repeating the steps of determining the initial alignment, generating the transition model and the action model, and determining the best alignment until a convergence is detected* (Fast and Detail Matches in Decoding Phase; Fig. 5, page 8 line 42 – page 9 line 48).

-- Claim 17:

Bellegarda discloses *the method of claim 15, wherein generating a transition model and an action model of the initial alignment and generalization comprises generating a transition model for at least one node and an action model for the at least one node* (The transition and action functions are explicitly defined in the disclosure as follows. The transition function yields a probabilistic assignment of the current step over the nodes given the input at the current step and that the previous node is *n*. The output function yields a probabilistic assignment of the current user action over all possible user actions given the input at the current user action over all possible user actions

given the input at the step and that the current node is *n*. Items 701 + 619 and 703 – 709 of Fig. 7 meet the above stated requirements for IOHMM; Fig. 7, page 11 lines 1 – 49).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Bellegarda** (5,644,652).

-- Claim 20:

Bellegarda discloses *a method for generating one or more computer executable procedures.*

Bellegarda does not explicitly disclose the method comprises:

- *recording a state of a computer system.*

Recording a state of a computer system, however, is a step well-known in the art of software development as admittedly disclosed in Applicant's Specification (Page 9: lines 9 – 12; "...the existence of a device or a computer programs ...that observes users performing instances of procedure as well as the state and behavior of the computer system at which the procedure is performed is assumed." Thus, it would have been obvious to one of ordinary skill in the art at the time **Bellegarda**'s invention was made to utilize a computer system (e.g., PDA) capable of recording a state of the system to provide the Hidden Markov Models with the system related information as statistical parameters.

Bellegarda discloses the method comprises

• *recording at least one trace of user actions that change the state of the computer system;*

(Fig. 2, page 5 lines 24 – 32; "...receives character or stroke information produced by a user using the stylus...." The writing of a character or stroke changes the state of the user interface and, thus, the system.)

• *performing an alignment of a plurality of user actions of the at least one trace to at least a second trace to determine a plurality of aligned user actions;*

• *performing a generalization of the plurality of aligned user actions to determine a plurality of generalized and aligned user actions;*

(data is sorted by independent writer and Viterbi aligned for each writer; Figs. 6 – 7, page 9 line 59 – page 11 line 49)

• *selecting a generalized and aligned user action using an alignment-generalization functional to represent a respective user action of the at least one trace; and*

(Page 9: line 50 – 53; "...the handwriting recognition program would decode the selected character as the character corresponding to the HMM which yielded the highest probability...".)

• *generating the one or more computer-executable procedures executable by the computer system consistent with a selected generalized and aligned user action.*

(Fig. 6, page 9: line 59 – page 10: line 27; derivation of HMM models and Viterbi aligned data during initialization phase.)

Response to Arguments

12. In response to applicant's argument that **Bellegarda** is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which Applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992).

In this instance, although **Bellegarda**'s disclosure pertains to image processing, specifically handwriting recognition, it is clear to one of ordinary skill in the art of software development that the actual implementation of the disclosed method is a software intensive process as it can be seen by the various flowchart illustrations in the drawings as well as algorithmic descriptions in the specification of **Bellegarda**. Furthermore, **Bellegarda**'s disclosure addresses the problem of decoding handwriting of different writers by deriving allograph models from a pool of handwriting samples of writers, which is reasonably pertinent to the claimed invention of Applicant.

13. Applicant's arguments filed 10/17/2006 have been fully considered but they are not persuasive for the following reasons:

Applicant argues that **Bellegarda** does not teach methods for generating procedures, specifically, derivation of a model is not analogous to generating a computer-executable procedure. Applicant traverses al rejected claims as well as the newly added claim(s) based on the above argument.

Bellegarda discloses an automatic handwriting recognition method that samples a pool of independent writers and deriving a Hidden Markov Model (HMM) for each

particular character, which is independent of a particular writer. The sample data from each writer is then statistically aligned against each associated HMM. Once such an alphabet is constructed, a new set of HMMs can be defined which more accurately reflects parameter typing across writers.

Since **Bellegarda**'s handwriting recognition is a software implementation (Fig. 1, column 5: lines 16 – 18; "...the hand recognition software..."). As a result, the derivation of the Hidden Markov Models as well as the realization of the Hidden Markov Models themselves are necessarily carried out in the form of software components, particularly computer-executable procedures (Fig. 6, column 9: line 59 – column 10: line 27; initialization phase for generating HMMs). The statistical modeling of HMMs (Fig. 11) as well as any algorithmic derivation of them would not have been useful to the handwriting recognition software unless they are made accessible (in the form of computer-executable procedures) to Fast Match and Detailed Match procedures; Therefore, it is understood that the derivation of the HMMs is, in fact, analogous to generating computer-executable procedures. The procedures implementing the HMMs are subsequently utilized in Fast Match (Fig. 5A, page 8: line 42 – page 9: line 4) and Detail Match (Fig. 5B, page 9: lines 5 – 58) decoding phases.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai Van Pham whose telephone number is (571) 270-1064. The examiner can normally be reached on Monday - Thursday, 9am - 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Myhre can be reached on (571) 270-1065. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you

have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000

TVP
10/26/2006

Wei Y. Zhen
Supervisory Patent Examiner